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EXAMINER	
DIAMOND, ALAN D	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 01/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/031,366	LOCK ET AL.	
	Examiner	Art Unit	
	Alan Diamond	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,16-26 and 28-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4-6,13,14,16,31 and 32* is/are allowed.

6)☒ Claim(s) *1-3,7-12,17-26,28,29,34 and 35* is/are rejected.

7)☒ Claim(s) *30 and 33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Comments

1. The proposed drawing corrections filed November 8, 2004 are acceptable. Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the instant Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. The prior objection to the drawings will not be held in abeyance.

2. The objection to the specification for informalities has been overcome by Applicant's amendment thereof.

Specification

3. The disclosure is objected to because of the following informalities: On page 13, at line 34, the term "I.e." should be changed to "i.e." Appropriate correction is required.

Claim Objections

4. Claim 30 and 33 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 30 does not further limit parent claim 14 because parent claim 14 requires that the electrodes are sinusoidal or half sinusoidal. Sinusoidal or half sinusoidal is serpentine. Thus, claim 30 presents a limitation that is inherently present in claim 14.

Claim 33 does not further limit parent claim 13 because parent claim 13 already requires that the electrodes are serpentine.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 34 and 35 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 34, the combination of the electrodes having two sinusoids and being zig-zag is not supported by the specification, as originally filed.

In claim 35, the combination of the electrodes having two sinusoids and being straight line approximation to sinusoids is not supported by the specification, as originally filed.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 28, 29, 34 and 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 28 and 29 are indefinite because parent claim 18 is not drawn to "A DEP cell". It is suggested that the term "A DEP cell" at line 1 in each of claims 28 and 29 be changed to "A method".

Claim 34 is indefinite because parent claim 13 already requires that the electrodes are serpentine. An electrode that is serpentine is not and cannot be zig-zag in shape.

Claim 35 is indefinite because parent claim 13 already requires that the electrodes are serpentine. An electrode that is serpentine is not and cannot be a straight line approximation to sinusoids in shape.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-3, 7, 8, 10, 18, 21, 28, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by, or in the alternative, under 35 USC 103(a) as obvious over Tai et al, WO 99/17883. Tai et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have a zigzag sinusoidal shape, as

here claimed (see Figure 3B; page 7, lines 10-15; and page 14, lines 15-29). It is the Examiner's position that when dielectrophoresis is performed, as described by Tai et al at page 14, lines 15-29, using the electrodes as shown in Figure 3B, the instant at least one particle channel will be present. Since Tai et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instantly claimed at least one particle channel would obviously have been present once Tai et al's device has been provided and used to perform dielectrophoresis. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

12. Claims 1, 17, 18, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 USC 103(a) as obvious over Pethig et al, WO 98/04355. Pethig et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have deflections from the notional central axis as here claimed (see Figures 2, 3, and 5; and claims 1, 2, 6, 8, and 9). It is the Examiner's position that when dielectrophoresis is performed using the electrodes as shown in Pethig et al's Figures 2 and 3, the instant at least one particle channel will be present. Since Pethig et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instantly claimed at least one particle channel would obviously have been present once Pethig et al's device has been provided and used to perform dielectrophoresis. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the

providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

13. Claims 1, 18-21, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 USC 103(a) as obvious over Talary et al, "Electromanipulation and separation of cells using traveling electric fields," J. Phys. D. Appl. Phys., Vol. 29, pages 2198-2203, (1996). Talary et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have deflections from the notional central axis as here claimed (see Figure 1, and pages 2198-2199). It is the Examiner's position that when dielectrophoresis is performed using the electrodes as shown in Talary et al's Figures 1 and 2, the instant at least one particle channel will be present. Since Talary et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instantly claimed at least one particle channel would obviously have been present once Talary et al's device has been provided and used to perform dielectrophoresis. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

14. Claims 1, 10-12, 18-25, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 USC 103(a) as obvious over Becker et al, U.S. Patent 5,858,192. Becker et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have deflections from the notional central axis as here claimed (see Figures 5A, 5B, 6A, 6B, 7A, and 7B; and col. 3, line 28

through col. 14, line 12). It is the Examiner's position that when dielectrophoresis is performed using the electrodes as shown in Becker et al's Figures 5A, 5B, 6A, 6B, 7A, and 7B, the instant at least one particle channel will be present. Since Becker et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instantly claimed at least one particle channel would obviously have been present once Becker et al's device has been provided and used to perform dielectrophoresis. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

15. Claims 1, 7-10, 18, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 USC 103(a) as obvious over Pethig et al, WO 97/34689. Pethig et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have deflections from the notional central axis as here claimed (see Figure 3; and page 10, lines 1-10; and claims 1, 5, and 6). It is the Examiner's position that when dielectrophoresis is performed using the electrodes as shown in Pethig et al's Figure 3, the instant at least one particle channel will be present. Since Pethig et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the instantly claimed at least one particle channel would obviously have been present once Pethig et al's device has been provided and used to perform dielectrophoresis. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the

providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

Claim Rejections - 35 USC § 103

16. Claims 1-3, 7-10, 17-26, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tai et al, WO 99/17883.

Tai et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have a zigzag sinusoidal shape, as here claimed (see Figure 3B; page 7, lines 10-15; and page 14, lines 15-29). It is the Examiner's position that when dielectrophoresis is performed, as described by Tai et al at page 14, lines 15-29, using the electrodes as shown in Figure 3B, the instant at least one particle channel will be present. Tai et al teaches the limitations of the instant claims other than the difference which is discussed below.

Tai et al does not specifically teach, for example, selecting a frequency for its electrical signals to cause a negative dielectrophoretic response in a selected particle type in a suspension and providing means to cause the liquid suspension to flow across the electrode array, the initial steps recited in claims 22 and 23, or the concentrations differing by a factor of at least 1000. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided these features so as to perform the dielectrophoresis.

17. Claims 1, 17-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pethig et al, WO 98/04355.

Pethig et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have deflections from the notional central axis as here claimed (see Figures 2, 3, and 5; and claims 1, 2, 6, 8, and 9). It is the Examiner's position that when dielectrophoresis is performed using the electrodes as shown in Pethig et al's Figures 2 and 3, the instant at least one particle channel will be present. Pethig et al teaches the limitations of the instant claims other than the difference which is discussed below.

Pethig et al does not specifically teach, for example, selecting a frequency for its electrical signals to cause a negative dielectrophoretic response in a selected particle type in a suspension and providing means to cause the liquid suspension to flow across the electrode array, the initial steps recited in claims 22 and 23, or the concentrations differing by a factor of at least 1000. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided these features so as to perform the dielectrophoresis.

18. Claims 1, 17-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talary et al, "Electromanipulation and separation of cells using traveling electric fields," J. Phys. D. Appl. Phys., Vol. 29, pages 2198-2203, (1996).

Talary et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have deflections from the notional central axis as here claimed (see Figure 1, and pages 2198-2199). It is the Examiner's position that when dielectrophoresis is performed using the electrodes as shown in Talary et al's Figures 1

and 2, the instant at least one particle channel will be present. Talary et al teaches the limitations of the instant claims other than the difference which is discussed below.

Talary et al does not specifically teach, for example, the initial steps recited in claims 22 and 23, or the concentrations differing by a factor of at least 1000. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided these features so as to perform the dielectrophoresis.

19. Claims 1, 10-12, 17-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al, U.S. Patent 5,858,192.

Becker et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have deflections from the notional central axis as here claimed (see Figures 5A, 5B, 6A, 6B, 7A, and 7B; and col. 3, line 28 through col. 14, line 12). It is the Examiner's position that when dielectrophoresis is performed using the electrodes as shown in Becker et al's Figures 5A, 5B, 6A, 6B, 7A, and 7B, the instant at least one particle channel will be present. Becker et al teaches the limitations of the instant claims other than the difference which is discussed below.

Becker et al does not specifically teach, for example, a concentration of suspension of particles is greater that one million cells per milliliter, as per claim 26. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a concentration of suspension of particles greater that one million cells per milliliter so as to separate the cell using Becker et al's apparatus. Becker et al's apparatus can discriminate cells at a rate of between about 1000 and 3 million cells per second (see col. 15, lines 18-21).

20. Claims 1, 7-10,17-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pethig et al, WO 97/34689.

Pethig et al teaches the instant dielectrophoretic cell and dielectrophoretic method wherein the electrodes have deflections from the notional central axis as here claimed (see Figure 3; and page 10, lines 1-10; and claims 1, 5, and 6). It is the Examiner's position that when dielectrophoresis is performed using the electrodes as shown in Pethig et al's Figure 3, the instant at least one particle channel will be present. Pethig et al teaches the limitations of the instant claims other than the difference which is discussed below.

Pethig et al does not specifically teach, for example, selecting a frequency for its electrical signals to cause a negative dielectrophoretic response in a selected particle type in a suspension and providing means to cause the liquid suspension to flow across the electrode array, the initial steps recited in claims 22 and 23, or the concentrations differing by a factor of at least 1000. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided these features so as to perform the dielectrophoresis.

Response to Arguments

21. Applicant's arguments filed November 8, 2004 have been fully considered but they are not persuasive.

Applicant argues that claims 1 and 18 have been amended to provide that inter-electrode spacing variation gives rise to at least on particle channel, and that this feature is not taught or suggested by the applied prior art. However, this argument is

not deemed to be persuasive because all of the devices of the applied prior art (i.e., of Tai et al, Pethig et al '355, Talary et al, Becker et al, and Pethig et al '689) have inter-electrode spacing, and any path (straight or curved) that a particle travels in the devices of the applied prior art reads on an instant channel. In any event, Figure 3B of Tai et al uses identical electrodes as here claimed, and said identical electrodes will inherently result in the claimed at least one particle channel.

Applicant provides arguments that Tai et al is drawn to eletrostatic transportation of particles (EPT), whereas the instant claims are drawn to dielectrophoretic transportation of particles. Applicant also argues that Tai et al deals with transportation of particles in air, and that this is not possible in Applicant's claimed invention. However, Applicant's arguments are not deemed to be persuasive because Tai et al clearly teaches particle transport in liquid, and that the particles can be moved by dielectrophoretic force (see page 14, lines 15-24).

Applicant argues that Pethig et al '355 does not teach or suggest transporting and separating particles along an electrode array using traveling dielectrophoretic fields. However, this argument is not deemed to be persuasive because the instant claims rejected over Pethig et al '355 are silent with respect to traveling dielectrophoretic fields. In other word, Applicant has argued a limitation that is not in the rejected claims.

Applicant argues that the electrodes of Talary et al cannot deflect particles that travel in opposite directions into separate paths and produce the effect of traffic control. However, this argument is not deemed to be persuasive because Applicant is arguing

limitations that are not in the instant claims rejected over Talary et al. Talary et al anticipates or renders obvious the instant claims.

Applicant argues that Talary et al provides channels rather that the generation of at least one particle channel. However, this argument is not deemed to be persuasive because, as seen in Talary et al's Figures 1 and 2, the spacing of electrodes does "give rise" to particle channels as here claimed.

Applicant argues that in Becker et al, the spiral electrode geometry does not produce the effect of deflecting counter-moving particles into separate paths and thus, that Becker et al does not teach or suggest the generation of at least one particle channel. However, this argument is not deemed to be persuasive because Becker et al has inter-electrode spacing, and any path (straight or curved) that a particle travels in Becker et al's device reads on an instant channel.

Applicant argues that Becker et al is not capable of providing traffic control. However, the argument is not deemed to be persuasive because Applicant is arguing a limitation that is not in the instant claims rejected over Becker et al.

Applicant argues that Pethig et al '689 describes how different particles moving in the same direction can be separated or brought together by traveling wave dielectrophoresis using an electrode array geometry in the form of a junction. Applicant argues that Pethig et al '689 does not teach or suggest Applicant's method of isolating particles moving in opposite directions along electrode array, and that "traffic control" is not recognized as possible. However, these arguments are not deemed to be persuasive because Applicant is arguing limitations that are not in the claims rejected by

Pethig et al '689. The Examiner maintains that Pethig et al '689 teaches or suggests the claimed apparatus and method.

Allowable Subject Matter

22. Claims 4-6, 13, 14, 16, 31, and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-

1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
January 17, 2005